REMARKS

Rejection of Claims and Traversal Thereof

In the May 6, 2002 Office Action:

claims 21-27, 60 were rejected under 35 U.S.C. §112, first paragraph;

claims 21, 26-27, 55-56,[sic] 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,405,590 issued to Macedo, et al.;

claims 21, 26-27 and 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,147,756 issued to Dahlstrom, et al.; and

claims 21, 26-27 and 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,019,818 issued to Knapp.

These rejections are hereby traversed in respect of the pending claims 21, 26-27, 51-58 and 61-62 as amended herein.

Reconsideration of the patentability of the pending claims is therefore requested in light of the following remarks.

Rejection under 35 U.S.C. § 112, first paragraph

In the May 6, 2002 Office Action, claims 21-27, 60 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The Office further made statements of rejections relating to claims 51, 53, 52, 57 and 58 but these claims were not included in the general statement of rejection. It should be noted that no specific rejection was made for claim 60. Notwithstanding this confusion, applicants will address each statement of rejection.

According to the Office, the terminology "neutral water" is used for removing silane, not for the 2-step process. Claim 52 as now amended recite a process according to claim 21 wherein the gas component is silane and the scrubbing liquid in the first contacting chamber and second chamber is neutral water. The Office contends that there is no support for the terminology "neutral water" in combination with the double scrubbing unit. Applicants vigorously disagree because applicants have expressly stated at page 33, line 11-16, that

> "It has been surprisingly and unexpectedly found that silane can be destroyed with an efficiency up to about 50% in a high efficiency water scrubbing unit when using neutral water as the scrubbing liquor. This is a very surprising result, since it is well known that silane is highly insoluble in water and that silane is non-reactive in non-basic aqueous solutions. It may be that the removal reaction of silane in water is catalyzed by the small amount of O_2 that is naturally present in water."

Clearly, the neutral water used as a scrubbing liquid is effective whether in just one scrubbing unit or two sequential scrubber units. The Office bears the initial burden of presenting a *prima facie* case of unpatentability. *In re Oetiker*, 24 USPQ2d 1443 (Fed. Cir. 1992). Insofar as the written description requirement is concerned, that burden is discharged by "presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims." *In re Wertheim*, 191 USPQ 90 (CCPA 1976). If the specification contains a description of the claimed invention, albeit not *in ipsis verbis*, then the examiner, in order to meet the burden of proof, must provide reasons why one of ordinary skill in the art would not consider the description sufficient.

Applicants submit that one skilled in the art would recognize that neutral water can be used in both the first and second scrubbing chambers.

The Office further contends that there is no clear support for the claimed limitation "the second scrubbing zone contains no caustic reagent" as recited in claims 51, 52 and 53. Applicants vigorously disagree.

On page 33, lines 27-28 of the specification, it is clearly stated that "silane can be abated in a water scrubber by use of a caustic chemical injection agent such as KOH." As such KOH is described as

a "caustic chemical injection agent". The second scrubbing zone is discussed on page 46, lines 1-7 of the specification and it is expressly stated that:

> "This column is typically much smaller than the first stage column. The smaller column size enables proper wetting of the packing with a much lower water flow rate as compared to the first stage column. The required water flow rate is low enough so that fresh make-up water can be used for this purpose. The efficiency of the column is therefore high and allows the 2-stage scrubber system to operate without **using chemical injection agents** or large amounts of fresh water. " (emphasis added)

One skilled in the art would understand and recognize that the caustic agent which is defined as a chemical injection agent could be used in the second scrubbing column. As stated above, if the specification contains a description of the claimed invention, albeit not *in ipsis verbis*, then the examiner, in order to meet the burden of proof, must provide reasons why one of ordinary skill in the art would not consider the description sufficient.

The Office contends that claims 55-56 reciting that the second scrubbing unit has a smaller diameter than the first scrubbing unit makes the scope of claims 21 and 26 broader. Applicants are at a loss as to how to explain to the Examiner the subtleties of claim drafting and the fact that dependent claims add an additional limitation to the independent claims. Independent claims 21 and 26 are limited by the fact that the second scrubbing unit has a small volume than that of the first scrubbing unit. Thus, claims 55 and 56 further limit the second scrubbing unit to a smaller diameter vessel than that of the first scrubbing vessel. Therefore, the scrubber system of claims 55 and 56 not only have a smaller volume than the first scrubbing unit but also has a smaller diameter than the first scrubbing unit.

According to the Office, the limitation of "about one fifth," in claims 57-58, includes values slightly higher than 0.20 and there is no support in the instant specification for any value higher than 0.20. Applicants submit that it is well settled in the law that the relative term "about" is not objectionable *per se*, provided the disclosure gives one skilled in the art sufficient guidance to enable him to ascertain the scope of the claims with reasonable certainty and provided the term in question adequately distinguish the claimed subject matter from the prior art. *Andrew Corp v. Gabriel Electronics*, 6 USPQ2d 2010 (Fed. Cir. 1988). Further, "about" is not considered broad or arbitrary but rather is a flexible term with a meaning similar to "approximately."

The Federal Circuit recently ruled in several cases involving the using of the term "about" and in one decision ruled that a difference of 10% from the claimed amount was too far from the claimed amount and thus not covered by the claim. (*Eiselstein v. Frank*, 34 USPQ2d 1467 (Fed. Cir. 1995)). Likewise the Federal circuit ruled in *Conopco Inc. v. May Dept. Stores Co.* 32 USPQ2d 1225 (1994) that the phase "about 40:1" did not encompass the ratio 169:1 because it would ignore the ordinary meaning of the term "about". These rulings show that "about" has the general meaning of approximately and provide some limited range about the claimed value.

The Office should be aware that section 112 requires only reasonable precision in delineating the bounds of the claimed invention and the term "about one fifth" reasonably apprises those skilled in the art of the bounds of the claimed invention. Thus one skilled in the art would have no difficulty in understanding the scope of the term "about one fifth."

Applicants submit that all claims currently pending satisfy all requirements under 35 U.S.C. 112, first paragraph and second paragraph. Withdrawal of all disclosure rejections is respectfully requested.

Rejection under 35 U.S.C. 103(a)

1. Claim 21, 26-27, 55-56, 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over Macedo, et al. Applicants traverse the rejection and submit that Macedo, et al. does not render applicants' claimed invention *prima facie* obvious.

The presently claimed invention relates to an abatement system that comprises a first scrubbing unit wherein the effluent gas is flowed co-currently with a scrubbing liquid to remove gases and solids. From the first stage scrubber unit, the partially treated gas flows to a second stage scrubber unit. The second scrubbing unit is smaller in volume than the first stage scrubber unit. The smaller size of the second scrubbing unit, due to the smaller volume constraints, enables proper wetting with a lower water flow rate. Most preferably, the diameter of the second scrubbing unit is about one fifth the diameter of the first scrubbing unit. Further, the efficiency of the two stage scrubber is high and allows the system to operate without using chemical injection agents such as a caustic agent and/or large amounts of fresh water.

The Office admits that Macedo, et al does not disclose a second scrubbing unit that is smaller than the first scrubbing unit. However, the Office contends that the cited reference teaches a two stage scrubbing system and that it would have been obvious to one having ordinary skill in the art to optimize the size of the scrubber units to obtain the best results. Applicants disagree because the cited reference has provided no guidance as to which parameters are critical and has given no direction as to which of the many choices of different sizes is likely to be successful.

The Office has not provided objective or specific teachings or suggestions in the cited prior art to go in the direction of applicants. Obviousness cannot be established by modifying the teachings of the cited reference to produce the claimed invention, absent some teaching or suggestion of the desirability of the modification. Applicants respectfully submit that the Office's statement "that the claimed invention would be obvious to one having ordinary skill in the art" is not sufficient by itself to establish *prima facie* obviousness. The Office must explain with **specificity what areas of the reference would suggest the modification to go in the direction of applicants.**

Instead, the Office seems to be merely reinterpreting the prior art in light of applicants' disclosure, in order to reconstruct applicants' claimed invention, but without any instructional or motivating basis in the reference itself. Such approach is improper and legally insufficient to establish any *prima facie* case of obviousness.

Applicants do not agree with the Office that the presently claimed abatement process that includes a smaller secondary scrubbing unit relative to the first scrubbing unit was the result of obvious experimentation, since such experimentation would not have come from within the teachings of Macedo, et al. In determining whether or not such experimentation is within the teachings of Macedo, et al., the Office must be alert not to read obviousness into an invention on the basis of applicants' own statements. *In re Sponnoble*, 160 USPQ2d 237 (CCPA 1969).

The Macedo et al. reference may disclose a two chamber abatement system but the system is entirely different from the claimed invention. Macedo, et al. describes the importance of supply water/reagents solution from the secondary scrubber to the solid recovery scrubber to keep the total volume of the scrubbing solutions fixed no matter how many scrubber are being used. (see column 3, lines 3-7 of the Macedo, et al. reference). Further it is stated by Macedo, et al. that one of the objects of the invention is to use a flow of reagent from a higher side in the secondary scrubber to a lower side in the solid recovery scrubber (first) to replenish rapidly, depleted

reagents in the solid scrubber. (see column 3, lines 8-15). Still further, it is taught by Macedo, et al. that if the two scrubbers are situated in such a way that their solution levels are the same, then the reagents will diffuse naturally through an open line between the secondary scrubber to the solid recovery scrubber. Thus reagents can only be added to the secondary scrubber which then flow to the solid scrubber if the two scrubber are communicating through an open line. (see column 3, lines 28-32)

In viewing the Macedo, et al. reference, the only experimentation for achieving a better abatement system that Macedo, et al. teaches or suggests to one skilled in the art is to balance the levels of fluids between the two scrubbing chambers and flow liquid and reagents from the secondary chamber to the first chamber. Thus, Macedo, et al., is concerned only with transfer of liquid from the higher side of the secondary scrubber to the first scrubber to maintain a high reagent level in the first scrubber. Clearly, Macedo, et al does not recognize that the size of the secondary scrubber is a result-effective variable.

According to the Office, the second scrubbing units in Dahlstrom (discussed below) and Macedo are shown bigger than the first column, however, these figures are not drawn to scale, and the second column **might** have been drawn bigger in order to clearly show all the details. The Office further states "there is no disclosure in the either reference requiring the second scrubber to be bigger than the first scrubber." Applicants submit that the fact that neither cited reference makes any reference to the size of the scrubber units is another indication that the references do not recognize the importance of correctly sizing the second scrubbing chamber. The Office has made applicants' point that the cited references DO NOT teach or suggest to go in the direction of applicants because neither makes any reference to size. Again, applicants remind the Office, that to meet its burden of establishing a *prima facie* case of obviousness, the Office must provide some suggestion to modify the cited references and reconfigure the dual scrubbing system so that the second scrubbing unit is smaller than the first scrubbing unit. This will be very difficult in light of the fact that the Office has already admitted that the cited references do not address the size of the second scrubbing unit.

In conclusion, and in light of the above discussion, applicants contend that the Office has not met its burden of establishing a *prima facie* case of obviousness. Accordingly, applicants respectfully

request that the rejection of claims 21, 26-27, 55-56 and 55-61 on the basis of obviousness, be withdrawn.

2. Claims 21, 26-27 and 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dahlstrom, et al. Applicants traverse the rejection and submit that Dahlstrom, et al. does not render applicants' claimed invention *prima facie* obvious.

Again, the Office admits that Dahlstrom, et al. does not disclose a second scrubbing unit that is smaller than the first scrubbing unit, but again contends that it would have been obvious to one having ordinary skill in the art to optimize the size of the scrubber units to obtain the best results after reading the Dahlstrom, et al. disclosure.

Applicants vigorously disagree because the cited reference has provided no guidance as to which parameters are critical and has given no direction as to which of the many choices of different sizes is likely to be successful. Furthermore, Dahlstrom, et al. provides no discussion relating to the importance of different chamber sizes. Dahlstrom, et al. clearly shows a second scrubbing unit that includes multiple component such as multiple spray heads 53 and 84, shown in Figure 1 and also the inclusion of a integral mist eliminating device 65 in the second scrubbing chamber. Clearly with the multiple spray heads to provide sufficient scrubbing medium, one reading the cited reference would not go in the direction of applicants and reduce the size and amount of flow into the second scrubbing unit.

The main thrust and teaching of the Dahlstrom, et al. reference is the injection of a sodium based chemical agent in the second scrubbing unit which is required to absorbs sulfur dioxide and further remove particulates from the gas. (see column 4, lines 25-29 of Dahlstrom, et al.) This fact would certainly provide evidence that the Dahlstrom, et al. reference never envisioned a scrubbing system that **did not** inject a chemical reagent, such as that recited in claims 51-53 of the present application.

As discussed above, the Office admits that that Dahlstrom, et al. does not mention the size of the second scrubber unit which is a very strong indication that the size of the second scrubbing unit is not consider important to Dahlstrom, et al. Thus, how could the cited reference suggest going in the direction of applicants and provide for a second scrubbing unit that was smaller than the first? Applicants remind the Office, that to meet its burden of establishing a *prima facie* case of

obviousness, the Office must provide some suggestion to modify the cited reference and reconfigure the dual scrubbing system so that the second scrubbing unit is smaller than the first scrubbing unit.

It is incumbent on the Office to provide some suggestion or teaching in the prior art that would lead one skilled in the art to proceed in the direction of applicant's claimed invention. Applicants submit that the Office has not provided objective or specific teachings or suggestions in the cited prior art to motivate one skilled to modify said references. Moreover, what is the asserted motivation put forth in either cited reference to reduce the size of the second scrubber unit. Neither Macedo, et al. nor Dahlstrom, et al. discusses the importance of minimizing the overall volume of the secondary chamber. The Courts have addressed this issue numerous times and have stated "The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification" *In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990) quoting *In re Gordon* 221 USPQ 1125 (Fed. Cir. 1984). It is further stated by the *Mills* Court that "It is not pertinent whether the prior art possesses the functional characteristics of the claimed invention if the reference does not describe or suggest its structure." Thus, this allegedly "obvious" maneuver is supported only by the Office's reinterpretation of the art in light of applicants' disclosure.

Accordingly, for reasons set forth above applicants contend that the Office has not met its burden of establishing a *prima facie* case of obviousness. Thus, applicants respectfully request that the rejection of claims 21, 26-27 and 55-61 on the basis of obviousness, be withdrawn.

3. Claims 21, 26-27 and 55-61 were rejected under 35 U.S.C. §103(a) as being unpatentable over Knapp. Applicants traverse the rejection and submit that Knapp does not render applicants' claimed invention *prima facie* obvious.

Knapp describes a single downflow apparatus which functions both as a quencher and a packed bed scrubber wherein the contaminated gas is cooled and contaminants removed simultaneously. In column 3, lines 8-10, the Knapp reference make one single statement about the addition of a polishing scrubber to further purify the gaseous products. Specifically the statement recites:

"if desired, a polishing scrubber may be used to further purify the gaseous products."

Applicants find it difficult to believe that the Office proposes that this one statement is sufficient to establish a *prima facie* case of obviousness. There is no discussion in Knapp as to whether this proposed polishing column includes a scrubbing liquid or not and the Office cannot speculate on the specifics of the supposed polishing column without some guidance from the reference.

Applicants have carefully scrutinized the Knapp reference and can find only the one statement about the polishing column. The Office makes reference to column 5, first full paragraph as suggesting a second scrubbing unit. Applicants have carefully review the specific paragraph and can find no reference to a dual scrubbing system that includes two separate chambers wherein the second scrubbing unit is smaller than the first and the water flow in the second chamber is lower than that of the first chamber.

Figure 1 of Knapp is recreated below for ease of reference.

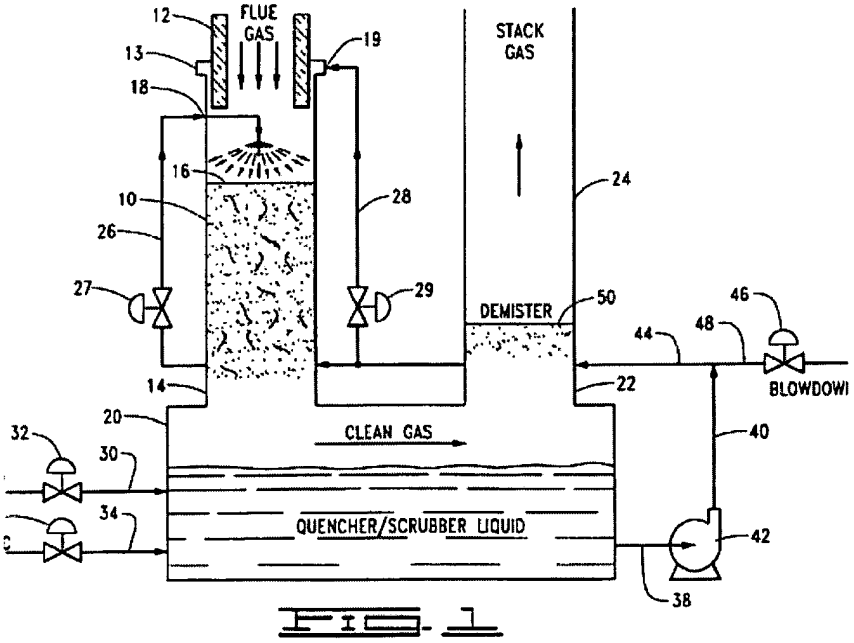


FIG. 1

This figure is described by Knapp in the following paragraph taken directly from the issued patent.

> "Referring now to the drawings, FIG. 1 shows a general arrangement of the quencher/scrubber of the present invention in which a column 10 is provided with an entry 12 and an exit 14. Within column 10 is situated a packed bed 16. Between entry 12 and column 10 is situated an HCI 13. Column 10 is also provided with an entry for quencher/scrubber liquid 18 and an entry for wall irrigation liquid 19. A sump 20 is situated below column 10. Sump 20 is provided with an entry connected to exit

> 14 of column 10 and an exit 22 connected with an exhaust manifold 24. Quencher/scrubber liquid is provided to column 10 above packed bed 16 by means of a conduit 26 and a valve 27. Wall irrigation liquid is supplied to HCI 13 via a conduit 28 and a valve 29. Fresh water is provided to sump 20 by means of a conduit 30 and a valve 32. Caustic is provided to sump 20 by means of a conduit 34 and a valve 36. Quencher/scrubber liquid is removed from sump 20 via a conduit 38 and a conduit 40 by means of a pump 42. Quencher/scrubber liquid and HCI liquid are provided to column 10 and HCI 13 via a conduit 44. The remainder of the quencher/scrubber liquid is discharged as blowdown by means of a conduit 48 and a control valve 46.
>
> The flue gas entering column 10 through entry 12 is simultaneously quenched and cleaned by packed bed 16. The cooled and cleaned gas leaving column 10 via exit 14 is passed through an appropriate device, such as a demister 50, to remove the droplets of quencher/scrubber liquid that are usually entrained in the clean gas as a result of the liquid cleaning process."

Applicants request that the Office provide an indication as to the location of a discussion in the above paragraph relating to a dual scrubbing system that includes a liquid scrubbing medium and the flow of scrubbing medium in the second scrubbing chamber that is less than that of the first scrubbing unit.

The only second unit that the Knapp reference describes that may be considered a polishing column is a demister **50** which accepts the gas after passing through the quencher/scrubber. Specifically the Knapp reference recites that:

> "the cleaned and cooled gas leaving column 10 via exit 14 is passed through an appropriate device, such as a demister 50, to remove the droplets of quencher/scrubber liquid that are usually entrained in the cleaned gas as a result of the liquid cleaning process."

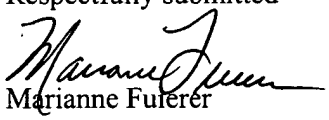
Clearly, this second stage is not a scrubbing unit that has a smaller volume size than the first scrubbing unit. Furthermore, there is certainly no additional scrubbing by a liquid medium because the purpose of the demister is to remove the entrained liquid from the first scrubbing unit.

Again the Office, to establish a prima facie case of obviousness, must show in the cited reference a clear teaching or suggestion to go in the direction of applicants. The Office has not met this burden. As such, this rejection under 35 U.S.C. 103(a) for obviousness must be withdrawn.

Conclusion

The pending claims 21, 26-27,51-58 and 61-62, as now amended, meet all disclosure requirements and patentably distinguish over the prior art, and in view of the forgoing remarks, it is respectfully requested that all rejections be withdrawn thereby placing the application in condition for allowance. Notice of the same is earnestly solicited. In the event that any issues remain, Examiner Nguyen is requested to contact the undersigned attorney at (919) 419-9350 to resolve same.

Respectfully submitted



Marianne Fuierer
Registration No. 39,983
Attorney for Applicants

INTELLECTUAL PROPERTY/
TECHNOLOGY LAW
P.O. Box 14329
Research Triangle Park, NC 27709
Phone: (919) 419-9350
Fax: (919) 419-9354
Attorney File: 4070-317CIP
(7484)

APPENDIX A

Please amend claims 21, 26-27, 51-54 and 61 as follows:

21. (Twice amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein, wherein said process additionally at least one of the steps of:

(a) introducing a chemical reagent for contact with the gas component to remove same from the gas stream in said gas/liquid contacting;

(b) introducing to the gas stream prior to entry thereof into the contacting chamber, a gas to enhance removal of silane from the gas stream when present therein;

(c) flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises cocurrent flow of the gas stream and scrubbing liquid and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber, and wherein the second contacting chamber has a lower water flow rate than the first contacting chamber;

(d) introducing an antifoam agent to scrubbing liquid for said gas/liquid contacting, to suppress foam production in the contacting chamber;

(e) suppressing deposition of calcium carbonate from scrubbing liquid containing calcium, including a step selected from the group consisting of:

(1) imposing a magnetic field on scrubbing liquid prior to use thereof in the contacting chamber;

(2) adjusting the pH of the scrubbing liquid to maintain pH thereof below 8.5;

(3) flowing the scrubbing liquid through a lime-soda ash bed prior to use of the scrubbing liquid in the contacting chamber; and

(4) precipitating the calcium content of the scrubbing liquid prior to use of the scrubbing liquid in the contacting chamber; and

(f) suppressing solids formation in a passage of the scrubbing system, said passage comprising a conduit to a pressure sensing device, including a step selected from the group consisting of flowing a purge gas through the passage to suppress solids formation therein, and heating the passage to suppress solids formation therein.

26. (Twice Amended) A scrubbing process for treatment of an effluent gas including acid gas components and water-scrubbable components other than acid gas component, said process comprising:

scrubbing the effluent gas with a neutral aqueous scrubbing liquid in a first scrubbing zone to remove the acid gas components of the effluent gas, with co-current flow contacting of the aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components;

flowing the effluent gas reduced in acid gas components from the first scrubber unit to a second scrubber unit; and

scrubbing the effluent gas with a second aqueous scrubbing liquid in the second scrubbing zone to remove water-scrubbable components other than acid gas component from the effluent gas, with counter-current flow contacting of the second aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components and water-scrubbable components other than acid gas components, wherein said second scrubbing zone has a volume smaller than that of said first scrubbing zone, and wherein the second scrubbing zone has a lower water flow rate than the first scrubbing zone chamber.

27. (Twice Amended) The process according to claim 26, wherein the first scrubbing zone is a vessel enclosing an interior volume containing a bed of packing medium.

51. (Amended) The process according to claim 26 wherein the scrubbing liquid in the second scrubbing zone contains no caustic chemical injection agent [reagent].

52. (Amended) The process according to claim 21 wherein the scrubbing liquid in the first contacting chamber and second chamber is neutral water.

53. The process according to claim 21 wherein the first scrubbing liquid contains no caustic chemical injection agent [reagent].

54. (Amended)The process according to claim 21 wherein the second scrubbing liquid contains no caustic chemical injection agent [reagent].

61. (Amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising:
introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein; flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises co-current flow of the gas stream and scrubbing liquid, and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber, and wherein the second contacting chamber has a lower water flow rate than the first contacting chamber. [61]

APPENDIX B

All Pending Claims

21. (Twice amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein, wherein said process additionally at least one of the steps of:

(a) introducing a chemical reagent for contact with the gas component to remove same from the gas stream in said gas/liquid contacting;

(b) introducing to the gas stream prior to entry thereof into the contacting chamber, a gas to enhance removal of silane from the gas stream when present therein;

(c) flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises cocurrent flow of the gas stream and scrubbing liquid and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber, and wherein the second contacting chamber has a lower water flow rate than the first contacting chamber;

(d) introducing an antifoam agent to scrubbing liquid for said gas/liquid contacting, to suppress foam production in the contacting chamber;

(e) suppressing deposition of calcium carbonate from scrubbing liquid containing calcium, including a step selected from the group consisting of:

(1) imposing a magnetic field on scrubbing liquid prior to use thereof in the contacting chamber;

(2) adjusting the pH of the scrubbing liquid to maintain pH thereof below 8.5;

(3) flowing the scrubbing liquid through a lime-soda ash bed prior to use of the scrubbing liquid in the contacting chamber; and

(4) precipitating the calcium content of the scrubbing liquid prior to use of the scrubbing liquid in the contacting chamber; and

(f) suppressing solids formation in a passage of the scrubbing system, said passage comprising a conduit to a pressure sensing device, including a step selected from the group consisting of flowing a purge gas through the passage to suppress solids formation therein, and heating the passage to suppress solids formation therein.

26. (Twice Amended) A scrubbing process for treatment of an effluent gas including acid gas components and water-scrubbable components other than acid gas component, said process comprising:

scrubbing the effluent gas with a neutral aqueous scrubbing liquid in a first scrubbing zone to remove the acid gas components of the effluent gas, with co-current flow contacting of the aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components;

flowing the effluent gas reduced in acid gas components from the first scrubber unit to a second scrubber unit; and

scrubbing the effluent gas with a second aqueous scrubbing liquid in the second scrubbing zone to remove water-scrubbable components other than acid gas component from the effluent gas, with counter-current flow contacting of the second aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components and water-scrubbable components other than acid gas components, wherein said second scrubbing zone has a volume smaller than that of said first scrubbing zone, and wherein the second scrubbing zone has a lower water flow rate than the first scrubbing zone chamber.

27. (Twice Amended) The process according to claim 26, wherein the first scrubbing zone is a vessel enclosing an interior volume containing a bed of packing medium.

51. (Amended) The process according to claim 26 wherein the scrubbing liquid in the second scrubbing zone contains no caustic chemical injection agent.

52. (Amended) The process according to claim 21 wherein the scrubbing liquid in the first contacting chamber and second chamber is neutral water.

53. The process according to claim 21 wherein the first scrubbing liquid contains no caustic chemical injection agent.

54. (Amended)The process according to claim 21 wherein the second scrubbing liquid contains no caustic chemical injection agent.

55. The process according to claim 21 wherein the second contacting chamber has a smaller diameter than the first contacting chamber.

56. The process according to claim 26 wherein the second scrubbing zone has a smaller diameter than the first scrubbing zone.

57. The process according to claim 21 wherein the diameter of the second contacting chamber is about one-fifth the diameter of the first contacting chamber.

58. The process according to claim 26 wherein the diameter of the second scrubbing zone is about one-fifth the diameter of the first scrubbing zone.

61. (Amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising:
introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein; flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises co-current flow of the gas stream and scrubbing liquid, and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber, and wherein the second contacting chamber has a lower water flow rate than the first contacting chamber.

62. The process according to claim 61 further comprising introducing a chemical reagent for contact with the gas effluent component to remove same from the gas effluent in the first scrubbing zone.